

CLAIMS

Claim 1 (Previously Presented) A home terminal apparatus connected to a router via a home network and for sending/receiving packet data to and from the router connected to an external network to which a server apparatus is connected, said home terminal apparatus comprising:

a packet generation unit operable to generate packet data to be sent to the server apparatus via the router;

a protocol determination unit operable to determine a communication protocol used between said home terminal apparatus and the server apparatus; and

a communication unit operable to send/receive the packet data to and from the server apparatus via the router,

wherein said protocol determination unit is operable to determine that said home terminal apparatus is to communicate with the server apparatus using (i) a first communication protocol, being a User Datagram Protocol (UDP), when said communication unit sends address notification packet data generated by said packet generation unit to the server apparatus periodically and repeatedly at a predetermined sending interval via the router, and (ii) a second communication protocol, being a Transmission Control Protocol (TCP), when said communication unit sends/receives control information to and from the server apparatus,

wherein when said communication unit receives, from the server apparatus, a notification packet indicating an occurrence of a control request to control said home terminal apparatus while said communication unit is repeating the sending, using the UDP, of the address notification packet on a periodical basis:

said packet generation unit is operable to generate a connection request packet, which is a packet for making a connection request to establish a TCP connection to the server apparatus;

said protocol determination unit is operable to determine that the connection request packet is to be communicated using the second communication protocol which is the TCP; and

said communication unit is operable to send the connection request packet to the server apparatus using the TCP, and operable to receive, from the server apparatus, control packet data, which is data including the control request in the TCP after the connection is established between the server apparatus and said home terminal apparatus using the second communication protocol which is the TCP.

Claim 2 (Cancelled)

Claim 3 (Cancelled)

Claim 4 (Previously Presented) The home terminal apparatus according to Claim 1 further comprising a management unit operable to manage a certificate, which is a certificate for verifying validity of said home terminal apparatus,

wherein said communication unit is operable to send, to the server apparatus, the certificate managed by said management unit, after receiving the notification packet.

Claim 5 (Previously Presented) The home terminal apparatus according to Claim 1 wherein:

said packet generation unit is operable to generate an inquiry packet, which is a packet for inquiring the server apparatus about the control request, when the connection is established to the server apparatus using the second communication protocol; and

said communication unit is operable to send the inquiry packet to the server apparatus via the router.

Claim 6 (Previously Presented) The home terminal apparatus according to Claim 1, further comprising an authentication unit operable to authenticate the server apparatus as a communication partner using a server certificate, which is a certificate for verifying validity of the server apparatus as the communication partner.

Claim 7 (Previously Presented) The home terminal apparatus according to Claim 6, wherein said authentication unit is operable to authenticate the validity of the server apparatus as the communication partner using an IP address of the server apparatus and/or terminal ID information unique to said home terminal apparatus, which is information included in the packet data received by said communication unit.

Claim 8 (Previously Presented) The home terminal apparatus according to Claim 6, wherein said authentication unit is operable to destroy the packet data, when said communication unit receives the packet data within a predetermined interval.

Claim 9 (Previously Presented) The home terminal apparatus according to Claim 1, further comprising an encryption unit operable to encrypt data in a channel between said home terminal apparatus and the server apparatus that uses the second communication protocol, when the control information is sent/received to and from the server apparatus.

Claim 10 (Previously Presented) The home terminal apparatus according to Claim 9, wherein said encryption unit uses SSL to encrypt the data in the channel.

Claim 11 (Previously Presented) The home terminal apparatus according to Claim 1, further comprising a control unit operable to control said home terminal apparatus according to the control information.

Claim 12 (Previously Presented) The home terminal apparatus according to Claim 11, wherein:

a plurality of terminal apparatuses are connected to said home terminal apparatus via the home network;

each of the terminal apparatuses includes an apparatus control unit operable to control each terminal apparatus, respectively;

said communication unit is operable to send the control information to each of the terminal apparatuses; and

each of the apparatus control units is operable to control each of the terminal apparatuses,

respectively, according to the control information.

Claim 13 (Previously Presented) The home terminal apparatus according to Claim 1, wherein the server apparatus includes:

a second communication unit operable to send/receive packet data to and from said home terminal apparatus via the router; and

a second packet generation unit operable to generate the packet data to be sent to said home terminal apparatus,

wherein the second packet generation unit is operable to generate a notification packet indicating an occurrence of a control request to control said home terminal apparatus, when the control request occurs in the server apparatus, and

wherein the second communication unit is operable to send the notification packet to said home terminal apparatus via the router.

Claim 14 (Previously Presented) The home terminal apparatus according to Claim 13, wherein:

a mobile terminal device is connected to the external network, the mobile terminal device being operable to send the control request to control said home terminal apparatus; and

the second packet generation unit is operable to generate the notification packet when the second communication unit receives the control request from the mobile terminal device.

Claim 15 (Previously Presented) The home terminal apparatus according to Claim 13,

wherein:

the second packet generation unit is operable to generate the control packet data including the control request; and

the second communication unit is operable to send the control packet data to said home terminal apparatus via the router, after the connection is established between said home terminal apparatus and the server apparatus using the second communication protocol.

Claim 16 (Previously Presented) The home terminal apparatus according to Claim 15, wherein the second communication unit is operable to send the control packet data to said home terminal apparatus via the router, only when the control request occurs in the server apparatus.

Claim 17 (Previously Presented) The home terminal apparatus according to Claim 15, wherein the second communication unit is operable to send the control packet data to said home terminal apparatus via the router, only when receiving, from said home terminal apparatus, an inquiry packet for inquiring about the control request.

Claim 18 (Previously Presented) The home terminal apparatus according to Claim 13, wherein:

the server apparatus further includes:

a terminal information storage unit operable to store, as terminal information, a terminal ID of said home terminal apparatus, a global address of the router which is an address of a sender, and a global port number of the router which is a port number of the sender, which is

information included in the packet data received by the second communication unit; and

an extraction unit operable to extract, from the terminal information storage unit, the global address and the global port number which correspond to the terminal ID, when the control request to control said home terminal apparatus with the terminal ID occurs in the server apparatus; and

the second packet generation unit is operable to generate the notification packet that includes notification information, the notification information being information indicating the occurrence of the control request, and the notification packet including, respectively as a destination address and a destination port number, the global address and the global port number extracted by the extraction unit.

Claim 19 (Previously Presented) The home terminal apparatus according to Claim 13, wherein:

the server apparatus further includes a second management unit operable to manage a server certificate, which is a certificate for verifying validity of the server apparatus; and

the second communication unit is operable to send, to said home terminal apparatus, the server certificate managed by the second management unit, after receiving, from said home terminal apparatus, the connection request packet, which is a packet for requesting a connection to the server apparatus using the second communication protocol.

Claim 20 (Previously Presented) The home terminal apparatus according to Claim 13, wherein the server apparatus further includes a second authentication unit operable to

authenticate said home terminal apparatus as a communication partner using a certificate, which is a certificate for verifying validity of said home terminal apparatus as the communication partner.

Claim 21 (Previously Presented) The home terminal apparatus according to Claim 13, wherein the server apparatus further includes a second encryption unit operable to encrypt data in a channel between said home terminal apparatus and the server apparatus that uses the second communication protocol when the control information is sent/received to and from said home terminal apparatus.

Claim 22 (Previously Presented) The home terminal apparatus according to Claim 13, wherein:

an application server is connected to the external network;

the second packet generation unit of the server apparatus is operable to generate the notification packet indicating the occurrence of the control request, the notification packet including an application server identifier for identifying the application server;

the second communication unit is operable to send the notification packet to said home terminal apparatus via the router;

said home terminal apparatus further comprises:

a storage unit operable to store application server identifier/address information including at least the application server identifier and an address of the application server; and

an extraction unit operable to extract, from the application server

identifier/address information stored by said storage unit, the address of the application server that corresponds to the application server identifier included in the notification packet, when said communication unit receives the notification packet from the router; and

said packet generation unit is operable to generate the connection request packet, which is a packet that describes the address of the application server as a destination address.

Claim 23 (Previously Presented) The home terminal apparatus according to Claim 22, wherein:

said storage unit is operable to store a port number of the application server to the application server identifier/address information;

said extraction unit is operable to extract, from the application server identifier/address information stored by said storage unit, the address of the application server and the port number of the application server that correspond to the application server identifier included in the notification packet, when said communication unit receives the notification packet from the router;

said packet generation unit is operable to generate the connection request packet that describes the address of the application server as the destination address and the port number of the application server as a destination port number; and

said communication unit is operable to send the connection request packet to the server apparatus via the router.

Claim 24 (Previously Presented) The home terminal apparatus according to Claim 22,

wherein:

said storage unit is operable to store the application server identifier/address information that includes the application server identifier and a URL of the application server;

said extraction unit is operable to extract, from the application server identifier/address information stored by said storage unit, the URL of the application server that corresponds to the application server identifier included in the notification packet, when said communication unit receives the notification packet from the router; and

said communication unit is operable to send the connection request packet to the URL.

Claim 25 (Previously Presented) The home terminal apparatus according to Claim 24, wherein:

an address list notification server is connected to the external network;

the address list notification server includes a sending unit operable to send, to said home terminal apparatus, an address list notification packet, which is a packet including another application server identifier/address information via the router; and

said home terminal apparatus further comprises an update unit operable to update the application server identifier/address information stored by said storage unit, on the basis of the another application server identifier/address information included in the received address list notification packet from the router.

Claim 26 (Previously Presented) The home terminal apparatus according to Claim 1, wherein the router is directly connected to the external network, not via an internet service

provider.

Claim 27 (Previously Presented) A communication system comprising:

- a server apparatus connected to an external network;

- a home terminal apparatus connected to a home network; and

- a router which connects the external network and the home network, wherein:

 - said home terminal apparatus includes:

 - a packet generation unit operable to generate packet data to be sent to said server apparatus via said router;

 - a protocol determination unit operable to determine a communication protocol used between said home terminal apparatus and said server apparatus; and

 - a communication unit operable to send/receive the packet data to and from said server apparatus via said router;

 - said server apparatus includes:

 - a second communication unit operable to send/receive packet data; and

 - a second packet generation unit operable to generate the packet data to be sent to said home terminal apparatus; and

 - said protocol determination unit is operable to determine that said home terminal apparatus is to communicate with said server apparatus using (i) a first communication protocol, being a User Datagram Protocol (UDP), when said communication unit sends address notification packet data generated by said packet generation unit to said server apparatus periodically and repeatedly at a predetermined sending interval via said router, and (ii) a second

communication protocol, being a Transmission Control Protocol (TCP), when said communication unit sends/receives control information to and from said server apparatus,

wherein:

said second packet generation unit of said server apparatus is operable to generate a notification packet indicating an occurrence of a control request to control said home terminal apparatus, when the control request occurs in said server apparatus;

said second communication unit is operable to send the notification packet to said home terminal apparatus via said router;

when said communication unit of said home terminal apparatus receives the notification packet from said server apparatus while said communication unit is repeating the sending, using the UDP, of the address notification packet data on a periodical basis, said packet generation unit is operable to generate a connection request packet for making a connection request, which is a request to establish a TCP connection to said server apparatus, and said protocol determination unit is operable to determine that the connection request packet is to be communicated using the second communication protocol which is the TCP; and

said communication unit is operable to send the connection request packet to the server apparatus using the TCP, and operable to receive, from said server apparatus, control packet data, which is data including the control request in the TCP after the connection is established between said server apparatus and said home terminal apparatus using the second communication protocol which is the TCP.

Claim 28 (Cancelled)

Claim 29 (Previously Presented) A communication method in which an external network to which a server apparatus is connected and a home network to which a home terminal apparatus is connected are connected via a router, said communication method comprising home terminal apparatus steps executed by the home terminal apparatus and server apparatus steps executed by the server apparatus,

wherein the home terminal apparatus steps include:

generating packet data to be sent to the server apparatus via the router;

determining a communication protocol used between the home terminal apparatus and the server apparatus; and

sending/receiving the packet data to and from the server apparatus via the router,

wherein the server apparatus steps include:

sending/receiving packet data to and from the home terminal apparatus via the router; and

generating the packet data to be sent to the home terminal apparatus,

wherein, said determining of the communication protocol includes determining that the home terminal apparatus is to communicate with the server apparatus using (i) a first communication protocol, being a User Datagram Protocol (UDP), when address notification packet data, which is packet data generated in said generating of the packet data executed by the home terminal apparatus, is sent to the server apparatus periodically and repeatedly at a predetermined sending interval via the router in said sending/receiving of the packet data executed by the home terminal apparatus, and (ii) a second communication protocol, being a

Transmission Control Protocol (TCP), when control information is sent/received to and from the server apparatus in said sending/receiving of the packet data executed by the home terminal apparatus, and

wherein the home terminal apparatus steps further include, when the home terminal apparatus receives, from the server apparatus, a notification packet indicating an occurrence of a control request to control the home terminal apparatus while the home terminal apparatus is repeating the sending, using the UDP, of the address notification packet data on a periodical basis:

generating a connection request packet, which is a packet for making a connection request to establish a TCP connection to the server apparatus;

determining that the connection request packet is to be communicated using the second communication protocol which is the TCP;

sending the connection request packet to the server apparatus using the TCP; and

receiving, from the server apparatus, control packet data, which is data including the control request in the TCP after the connection is established between the server apparatus and the home terminal apparatus using the second communication protocol which is the TCP.

Claims 30-37 (Cancelled)

Claim 38 (Previously Presented) A program stored on a computer-readable storage medium for causing a home terminal apparatus connected to a router via a home network to send/receive packet data to and from the router connected to an external network to which a server apparatus

is connected, said program causing an execution of home terminal apparatus steps by the home terminal apparatus and an execution of server apparatus steps by the server apparatus, wherein:

the home terminal apparatus steps include:

generating packet data to be sent to the server apparatus via the router;

determining a communication protocol used between the home terminal apparatus and the server apparatus; and

sending/receiving the packet data to and from the server apparatus via the router; and

said determining of the communication protocol includes determining that the home terminal apparatus is to communicate with the server apparatus using (i) a first communication protocol, being a User Datagram Protocol (UDP), when address notification packet data, which is packet data generated in said generating of the packet data, is sent to the server apparatus periodically and repeatedly at a predetermined sending interval via the router in said sending/receiving of the packet data, and (ii) a second communication protocol, being a Transmission Control Protocol (TCP), when control information is sent/received to and from the server apparatus in said sending/receiving of the packet data, and

wherein the home terminal apparatus steps further include, when the home terminal apparatus receives, from the server apparatus, a notification packet indicating an occurrence of a control request to control the home terminal apparatus while the home terminal apparatus is repeating the sending, using the UDP, of the address notification packet data on a periodical basis:

generating a connection request packet, which is a packet for making a

connection request to establish a TCP connection to the server apparatus;

determining that the connection request packet is to be communicated using the second communication protocol which is the TCP;

sending the connection request packet to the server apparatus using the TCP; and

receiving, from the server apparatus, control packet data, which is data including the control request in the TCP after the connection is established between the server apparatus and the home terminal apparatus using the second communication protocol which is the TCP.

Claim 39 (Previously Presented) The program according to claim 38, wherein the server apparatus steps include:

sending/receiving packet data to and from the home terminal apparatus via the router;

generating the packet data to be sent to the home terminal apparatus; and

generating a notification packet indicating an occurrence of a control request to control the home terminal apparatus when the control request occurs in the server apparatus and sending the notification packet to the home terminal apparatus via the router.

Claim 40 (Cancelled)

Claim 41 (Cancelled)

Claim 42 (New) The home terminal apparatus according to claim 1, wherein the periodical basis is a cycle that is shorter than a period that a conversion table containing addresses is held by the router.